

CLAIMS

1 1. A large bandwidth add-drop filter for a planar waveguide device comprising:
2 at least one coupler receiving an input signal and providing an output signal; and
3 at least two grating waveguides having a photonic band-gap covering at least 4 optical
4 channels.

1 2. An add-drop filter as claimed in claim 1, wherein the photonic band-gap covers at
2 least 8 optical channels.

3 3. An add-drop filter as claimed in claim 1, wherein the grating waveguides have a
superstructure grating strength profile.

4 4. An add-drop filter as claimed in claim 1, wherein the grating waveguides have a
sampled grating strength profile.

5 5. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises a
directional coupler.

6 6. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises
multi-mode interference waveguides.

7 7. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises
diffracting slab waveguides.

1 8. An add-drop filter as claimed in claim 1, wherein at least one coupler comprises
2 diffracting slab waveguides. An add-drop filter as claimed in claim 1, wherein one or more
3 grating arms comprises delay-line waveguides.

1 9. An add-drop filter as claimed in claim 1, further comprising two couplers, in which
2 a first coupler provides an input port and a drop port and a second coupler provides an add
3 port and a transmission port.

1 10. An add-drop filter as claimed in claim 1, wherein the grating waveguides have
2 superstructure grating strength profiles providing spectrally periodic transmission bands
3 aligned with optical channels.

11. An add-drop filter as claimed in claim 9, wherein the superstructure has one or
multiple superperiods.

12. An add-drop filter as claimed in claim 1, wherein the grating waveguides have
sampled grating strength profiles providing a window transmission function, covering a band
of optical channels.

1 13. An add-drop filter as claimed in claim 1, wherein the grating waveguides have
2 sampled grating strength profiles providing two or more window functions, each covering
3 bands of optical channels.

1 14. An add-drop filter as claimed in claim 1 further comprising a grating tuner for
2 changing a group velocity of one or more of the grating waveguides.

1 15. An add-drop filter as claimed in claim 13, wherein the grating tuner heats at least
2 one of the grating waveguides.

1 16. A filter for a planar waveguide device comprising:

2 at least one coupler receiving an input signal and providing an output signal; and

3 at least two grating waveguides having a grating strength of higher than about

4 $\kappa = 0.006 \mu m^{-1}$.

1 17. A filter for a planar waveguide device comprising:

2 at least one coupler receiving an input signal and providing an output signal; and

3 at least two grating waveguides having a grating strength of higher than about

4 $\kappa = 0.013 \mu m^{-1}$.